Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1-24. (Cancelled)

25. (Previously Presented) An integrated circuit chip electrically interconnectable with a carrier substrate comprising:

a) a chip die having electrical contacts arranged on a surface thereof for providing electrical interconnection with electronic circuitry on a surface of the carrier substrate, said electrical contacts being flowable upon heating;

b) a fluxing agent disposed on a surface of said electrical contacts at a location capable of providing effective fluxing activity to said electrical contacts of said chip die and said electronic circuitry of the carrier substrate when said chip die is mated with the carrier substrate;

c) a first thermosetting underfill composition dispensed in a flowable form over said chip die about said electrical contacts and rendered non-flowable through an appropriate treatment, said first thermosetting underfill composition being distinct from said fluxing agent; and

d) a second thermosetting underfill composition dispensed in a flowable form over said first thermosetting underfill composition about said electrical contacts and rendered non-flowable through an appropriate treatment, said second thermosetting underfill composition being distinct from said first thermosetting underfill composition and said fluxing agent,

wherein upon mating said chip die with said carrier substrate to form a mated assembly and upon heating said mated assembly to a temperature sufficient to render said electrical contacts flowable, said electrical contacts flow to provide electrical interconnection between said chip die and said carrier substrate, and said first and second thermosetting underfill compositions are cured, thereby adhering said chip die to said carrier substrate.

26. (Previously Presented) An integrated circuit chip as in claim 25, wherein said fluxing agent is disposed over substantially the entire surface of said electrical contacts.

27. (Previously Presented) An integrated circuit chip as in claim 25, wherein at least a portion of said electrical contacts is exposed from said first and said second thermosetting compositions.

28. (Previously Presented) An integrated circuit chip as in claim 25, wherein said first and said second thermosetting compositions comprise a curable component, a curing agent for promoting cure of said curable component, and optionally, an inorganic filler component.

29. (Previously Presented) An integrated circuit chip as in claim 28, wherein said curable component comprises an epoxy resin.

30. (Previously Presented) An integrated circuit chip as in claim 29, wherein said epoxy resin is selected from the group consisting of bisphenol-A-type epoxy resin, bisphenol-F-type epoxy resin, phenol novolac-type epoxy resin, cresol novolac-type epoxy resin, polyepoxy compounds based on aromatic amines and epichlorohydrin, polyglycidyl derivatives of phenolic compounds; polyglycidyl derivatives of phenol-formaldehyde novolacs, polyglycidyl adducts of amines, aminoalcohols and polycarboxylic acids; and combinations thereof.

31. (Previously Presented) An integrated circuit chip as in claim 28, wherein said curing agent is selected from the group consisting of anhydride compounds, amine compounds, amide compounds, imidazole compounds, and combinations thereof.

32. (Previously Presented) An integrated circuit chip as in claim 28, wherein said inorganic filler component may be selected from the group consisting of materials constructed of or containing reinforcing silicas, aluminum oxide, silicon nitride, aluminum nitride, silica-coated aluminum nitride, boron nitride, and combinations thereof.

33. (Previously Presented) An integrated circuit chip as in claim 25, wherein said fluxing agent comprises an organic acid.

34. (Previously Presented) An integrated circuit chip as in claim 33, wherein said fluxing agent comprises a material selected from the group consisting of abietic acid, adipic acid, ascorbic acid, acrylic acid, citric acid, 2-furoic acid, malic acid, and polyacrylic acid.

35. (Previously Presented) An integrated circuit chip as in claim 25, wherein said fluxing agent comprises a latent organic acid.

36. (Previously Presented) An integrated circuit chip as in claim 25, wherein said fluxing agent comprises a thermally-activatable blocked organic acid.

37. (Previously Presented) An integrated circuit chip as in claim 25, wherein said fluxing agent further comprises an epoxy compound capable of drying to form a film of said fluxing agent on said electrical contacts and capable of reacting with at least one of said first or said second thermosetting underfill compositions upon curing of said first and second thermosetting underfill compositions.

38. (Previously Presented) An integrated circuit chip as in claim 25, wherein said chip die is constructed of material selected from the group consisting of silicon and germanium.

39. (Previously Presented) An integrated circuit chip as in claim 25, wherein said chip die is coated with a material selected from the group consisting of a polyimide-based material, poly-benzocyclobutane-based material, and a silicone nitride-based material.

40. (Previously Presented) An integrated circuit chip as in claim 25, wherein said carrier substrate is constructed of a material selected from the group consisting

of Al_2O_3, silicon nitride, mullite, polyimide, glass-reinforced epoxy, acrylonitrile-butadiene-styrene, and phenolic substrates.

41. (Previously Presented) An integrated circuit chip as in claim 25, wherein said electrical contacts comprise solder bumps.

42. (Previously Presented) An integrated circuit chip as in claim 25, wherein reaction products of at least one of said first or said second thermosetting underfill compositions are controllably degradable when exposed to appropriate conditions.

43. (Previously Presented) An integrated circuit chip as in claim 42, wherein at least one of said first or said second thermosetting underfill compositions comprises a curable compound having at least one thermally cleavable linkage, a curing agent for promoting cure of said curable compound, and optionally, an inorganic filler component.

44. (Previously Presented) An integrated circuit chip as in claim 43, wherein said compound having at least one thermally cleavable linkage is selected from the group consisting of diepoxides including acyclic acetal groups and full and partial episulfide equivalents thereof; diepoxides including secondary carbonyl linkages and full and partial episulfide equivalents thereof; diepoxides including tertiary carbonyl linkages and full and partial episulfide equivalents thereof; diepoxides including an aromatic moiety within the structure and full and partial episulfide equivalents thereof; and combinations thereof.

45. (Previously Presented) An integrated circuit chip as in claim 25, wherein said first thermosetting underfill composition when cured provides a first dielectric layer in contact with said chip die and having a coefficient of thermal expansion compatible with said chip die, and said second thermosetting underfill composition when cured provides a second dielectric layer in contact with said first dielectric layer and said carrier substrate and having a coefficient of thermal expansion compatible with said carrier substrate and said first dielectric layer.

46. (Previously Presented) A integrated circuit chip as in claim 25, wherein said chip die comprises a packaged integrated circuit, and said electrical contacts are arranged on said packaged integrated circuit for providing electrical interconnection with said electronic circuitry of said carrier substrate.

47. (Previously Presented) A circuit assembly comprising the assembled product of claim 25.

48. (Previously Presented) A method for assembling an integrated circuit assembly comprising:

a) providing an integrated circuit chip in accordance with claim 25;

b) mating said integrated circuit chip with a carrier substrate to form a mated assembly; and

c) exposing said mated assembly to temperature conditions sufficient to promote electrical interconnection between said integrated circuit chip and said carrier substrate and to cure said first and said second thermosetting underfill compositions, thereby adhering said integrated circuit chip to said carrier substrate.

49-56. (Cancelled)

57. (Currently Amended) A method ~~as in claim 55, further comprising a step d)~~ for assembling an integrated circuit chip prior to attachment to a substrate comprising the steps of:

a) providing a chip die having flowable electrical contacts arranged in a predetermined pattern thereon;

b) applying a fluxing agent over at least a portion of said electrical contacts;

c) drying said fluxing agent after said applying step;

d) dispensing a curable thermosetting underfill composition in a flowable form on said chip die around said electrical contacts and rendering said curable thermosetting underfill composition to a non-flowable form, said thermosetting underfill composition being distinct from said fluxing agent; and

e) dispensing a second thermosetting underfill composition in a flowable form on said thermosetting underfill composition around said electrical contacts, said second thermosetting underfill composition being distinct from said fluxing agent and said first thermosetting underfill composition.

58. (Currently Amended) A method as in claim 57, further comprising reducing the flowability of said thermosetting underfill composition and said second thermosetting composition after said dispensing step ~~d)~~ e).

59. (Currently Amended) A method as in claim 57, wherein any of said applying and said dispensing steps b), ~~c) and~~ d), and e) comprise screen printing, stencil printing, jet printing, pad printing, or offset printing.

60-61. (Cancelled)